

Exotic strange multibaryon states searches with Λ - hyperon and K_s^0 - meson systems in p+A collisions at momentum 10 GeV/c

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Review for exotic strange multibaryon states were observed in the effective mass spectra of: 1) $\Lambda\pi^+$, $\Lambda\pi^-$, Λp , Λpp , and ΛK_s^0 , $K_s^0\pi^\pm$ and K_s^0p subsystems. The invariant mass of $\Lambda\pi^+$ and $K_s^0\pi^\pm$ spectra has observed well known $\Sigma^{*+}(1385)$ and $K^{*\pm}(892)$ resonances. The width of $\Sigma^{*-}(1385)$ for p+A reaction is two time larger than that presented in PDG. The cross section of $\Xi^- \rightarrow \Lambda\pi^-$ is 7-8 times larger than expected geometrical cross section in p+propane interaction. A few events detected on the photographs of the propane bubble chamber, were interpreted as S=-2 light and heavy $H^{0,+}$ dibaryons.

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I. INTRODUCTION

There are a few actual problems of nuclear and particle physics which are concerning for this report. These are following goals: in-medium modification of hadrons, the origin of hadron masses, the restoration of chiral symmetry, the confinement of quarks in hadrons, the properties of cold dense baryonic matter and non-perturbative QCD, strange baryons in medium, Λ yields, the structure of neutron stars. Already back in 1977 Jaffe[2], using the bag model in which confined colored quarks and gluons interact as in perturbative QCD, suggested the existence of multi-quark states, glueballs and hybrids, but until now none is established. Recently, the existence of discrete nuclear bound states of $\bar{K}^0 p$ has been predicted with phenomenological Kaonic Nuclear Cluster (KNC) model which is based on the experimental information on the $\bar{K}^0 N$ scattering lengths, kaonic hydrogen atom and the $\Lambda^*(1405)$ resonance[3, 4]. Experimental efforts for S=+1 Θ^+ pentaquark have been motivated from report [15] where studied antidecuplet baryons by using the chiral soliton (Skyrme) models.

Searches for exotic strange multibaryon states with Λ - hyperon and K_s^0 -meson systems were published in reports [18]- [24].

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II. EXPERIMENT

The full experimental information of more than 700000 stereo photographs or 10^6 p+propane inelastic interactions are used to select the events with V^0 strange particles[22]. The masses of the observed 8657-events with Λ hyperon 4122-events with K_s^0 meson are consistent with their PDG values[22]. The experimental total cross sections are equal to 13.3 and 4.6 mb for Λ and K_s^0 production in the p+C collisions at 10 GeV/c. From published article one can see that the experiment is satisfactorily described by the FRITIOF model. The experimental Λ/π^+ ratio in the pC reaction is approximately two times larger than this ratio from pp reactions or from simulated pC reactions by FRITIOF model[8] at the same energy [22].

For the fit of the resonance signals, the mass spectra were taken to have the form[6, 21] $d\sigma(M)/dm = BG(M) + BW(M) \cdot PS(M)$, where BG, BW and PS represent background, Breit-Wigner(BW) function and phase space, respectively. The background has been obtained by three methods. The first is a polynomial (or Legendre polynom) method. The second method of the randomly mixing angle between decayed particles from different experimental events was described in [7, 21]. The third type of background has been obtained by FRITIOF model[8].

The statistical significance of resonance peaks were calculated as NP / \sqrt{NB} , where NB is the number of counts in the background under the peak and NP is the number of counts in the peak above background.

III. (Λ, π^+) AND (Λ, π^-) SPECTRA

The $\Lambda\pi^+$ - effective mass distribution for all 12088 combinations with bin size of 18 MeV/ c^2 in Fig.1a shows[23]. The resonance with similar decay properties for $\Sigma^{*+}(1382) \rightarrow \Lambda\pi^+$ registered which was a test for this method (Fig. 1a). The decay width is equal to $\Gamma \approx 45$ MeV/ c^2 . $\Delta M/M = 0.7$ in range of $\Sigma^{*+}(1382)$ invariant mass. The cross section of $\Sigma^{*+}(1382)$ production (540 simulated events) can estimated by FRITIOF model which is approximately equal to 1 mb for p+C interaction.

The $\Lambda\pi^-$ - effective mass distribution for all 4940 combinations with bin sizes of 18 and 12 MeV/ c^2 in Fig.1b,c shows. The solid curve(Fig.1b) is the sum of the background (by the polynomial method) and 1 Breit-Wigner resonance($\chi^2/N.D.F. = 39/54$). There is significant enhancement in the mass range of 1372 MeV/ c^2 with 11.3 S.D., $\Gamma = 93$ MeV/ c^2 . The cross section of Σ^{*-} production (≈ 680 events) is equal to ≈ 1.3 mb at 10 GeV/c for p+C interaction. The broadening width for

Σ^{*-} observed ≈ 2 times larger than PDG value. One of possible explanation is nuclear medium effects on invariant mass spectra of hadrons decaying in nuclei[1].

Figure 1c shows effective mass distribution with bin size of $12 \text{ MeV}/c^2$, where there are also significant enhancements in mass regions of $1345(3.0 \text{ S.D.})$ and $1480(3.2)$. The solid curve(Fig.1c) is the sum of the background and 1 Breit-Wigner resonance ($\chi^2/N.D.F. = 109/88$). The background (dashed) curve is the sum of the six -order polynomial and 1 Breit-Wigner function with parameters for identified resonance $\Sigma^{*-}(1385)$ (Fig.1c). There are negligible enhancements in mass regions of 1410 , 1520 and $1600 \text{ MeV}/c^2$. The cross section of Ξ^- - production (≈ 60 events) stopped in nuclear medium is equal to $15 \mu\text{b}$ at $10 \text{ GeV}/c$ for p+propane interaction. Expected number events with Ξ^- is equal 8 events($w=1/e_\Lambda = 5.3$, where w is a full geometrical weight of registered for Λ s). We observed that the experimental production of Ξ^- 7-8 times larger than the number of Ξ^- events which simulated by fritiof model. Figures shows that there is observed $\Sigma^{*-}(1480)$ correlation which is agreed with SVD2 report too[17].

IV. (Λ, p) AND (Λ, p, p) SPECTRA

Figure 2a) shows the invariant mass for all Λp 13103 combinations with bin size of $15 \text{ MeV}/c^2$ ([18]). There are enhancements in mass regions of 2100 , 2150 , 2225 and $2353 \text{ MeV}/c^2$ (Fig.2a). Figure 2b shows the invariant mass of 2434 (Λp) combinations with bin size of $15 \text{ MeV}/c^2$ ([18, 23]) for identified protons with momentum range of $0.350 < P_p < 0.900 \text{ GeV}/c$. There are significant enhancements in mass regions of 2100 , 2175 , 2285 and $2353 \text{ MeV}/c^2$ (Fig.2b). Their excess above background by the second method is 6.9 , 4.9 , 3.8 and 2.9 S.D. , respectively. There is also a small peak in $2225(2.2 \text{ s.d.}) \text{ MeV}/c^2$ mass region.

Figure 2c shows the invariant mass of 4011(Λp) combinations with bin size $15 \text{ MeV}/c^2$ for stopped protons in momentum range of $0.14 < P_p < 0.30 \text{ GeV}/c$. The dashed curve is the sum of the 8-order polynomial and 4 Breit-Wigner curves with $\chi^2 = 30/25$ from fits(Table I). A significant peak at invariant mass $2220 \text{ MeV}/c^2$ (6.1 S.D.), $B_K = 120 \text{ MeV}$ was specially stressed by Professor T. Yamazaki on $\mu\text{CF}2007$, Dubna, June-19-2007 that is conform with KNC model prediction by channel of $K^- pp \rightarrow \Lambda p$.

The Λp effective mass distribution for 2025 combinations with relativistic protons over a momentum of $P > 1.65 \text{ GeV}/c$ is shown in Figure 3a. The solid curve is the 6-order polynomial function($\chi^2/n.d.f=205/73$). The background for analysis of the experimental data are based on FRITIOF and the polynomial method. There are significant enhancements in mass regions of

2155(2.6 S.D.), 2225(4.7 S.D., with $\Gamma=23$ MeV/ c^2), 2280(4.2 S.D.), 2363(3.6 S.D.) and 2650 MeV/ c^2 (3.7 S.D.). These observed peaks for combinations with relativistic protons $P > 1.65$ GeV/ c agreed with peaks for combination with identified protons and with stopped protons.

The Λpp effective mass distribution for 3401 combinations for identified protons with a momentum of $P_p < 0.9$ GeV/ c is shown in Figure 3b[23?]. The solid curve is the 6-order polynomial function($\chi^2/\text{n.d.f}=245/58$, Fig.3b). The backgrounds for analysis of the experimental data are based on FRITIOF and the polynomial method. There is significant enhancements in mass regions of 3138b MeV/ c^2 (6.1 S.D.) and with width 44 MeV/ c^2 . There are small enhancements in mass regions of 3199(3.3 S.D.), 3320(5.1 S.D.), 3440(3.9 S.D) and 3652MeV/ c^2 (2.6 S.D.). These peaks from Λp and Λpp spectra were partly conformed with experimental results from FOPI(GSI), FINUDA(INFN), OBELIX(CERN) and E471(KEK).

A. Heavy S=-2, $H^+ \rightarrow K^- pp$ dibaryon

Stable S=-2 dibaryon state searches are going on[19],[24],[23],[5]. New candidates for S=-2 H^+ dibaryon shows in Fig. 3c .The appearance of its first part, 15.8 cm long, with a momentum of $p_{H^+} = 1.2 \pm 0.12$ GeV/ c and average relative ionization more than $I/I_0 > 2$. The second part is due to two stopped protons. The momentum of negative K^- is equal to 0.56 ± 0.03 GeV/ c ($I/I_0 \approx 1.5$). The kinematic threshold does not permit ($\sqrt{s}=1.96$ GeV/ c) imitating the reaction with deuteron including fermi motion. The $H^+ \rightarrow K^- pp$ hypothesis fits the event with $\chi^2(1V-3C)=2.6$, C.L.= 28%, and $M_{H^+} = 2482 \pm 48$ MeV/ c^2 . There is also possibility for fit by hypothesis with decay channel $H^+ \rightarrow \Sigma^+ \pi^- p$ which have much less probability than above hypothesis.

V. $K_s^0 p$ - SPECTRUM ANALYSIS

A. $K_s^0 p$ - spectrum at momentum of $0.350 \leq p_p \leq 0.900$ GeV/ c

Recently there are new reports for Θ^+ observation where statistical significance increased for $\Theta^+ \rightarrow K_s^0 p$ and that is equal to 7.3 S.D. from DIANA[16] and 8.0 S.D. from SVD2[17] collaborations. The results obtained from this experiment [20]: $M_{\Theta^+} = (1540 \pm 8)$ MeV/ c^2 , $\Gamma = (9.2 \pm 1.8)$ MeV/ c^2 ($\Gamma = (9.2 \pm 0.3)$ MeV/ c^2 , from PDG-04).

The $K_s^0 p$ effective mass distribution for 2300 combinations is shown in Fig. refkpa)[20]. The solid curve is the sum of the background and 4 Breit-Wigner resonance curves. The $K_s^0 p$ invariant

mass spectrum shows resonant structures with $M_{K_s^0 p} = 1540 \pm 8, 1613 \pm 10, 1821 \pm 11$ MeV/ c^2 and $\Gamma_{K_s^0 p} = 9.2 \pm 1.8, 16.1 \pm 4.1, 28.0 \pm 9.4$ MeV/ c^2 . The statistical significance of these peaks has been estimated as 5.5, 4.8 and 5.0 s.d., respectively. There are also small peaks in mass regions of 1690 (3.6 s.d.) and 1980 (3.0 s.d.) MeV/ c^2 . The primary total cross section for $\Theta^+(1540)$ production in $p + C_3H_8$ -interactions is estimated to be $\approx 90 \mu\text{b}$. The experimental spectrum for Θ^+ agree with the calculated rotational spectra from the theoretical reports of D. Akers[9], V.H.MacGregor, A.Nambu, P.Palazzi [11], A.A. Arkhipov [10].

There were similarly significant enhancements for the $(K_s^0, \text{pos.tracks})$ invariant mass distribution with a momentum $p_p \geq 1.7$ GeV/ c (3500 combinations) in mass regions of 1487, 1544, 1612 and 1805 MeV/ c^2 [20]. Their excess above background is 3.0, 3.9, 3.7 and 4.0 S.D., respectively. There is a small peak in the mass region of 1685 MeV/ c^2 .

B. $(K_s^0, \text{pos.tracks})$ - spectrum at momentum of $0.9 \leq p_p \leq 1.7$ GeV/ c

The $K_s^0, \text{pos.track}$ invariant mass spectrum shows resonant structures with $M = 1515$ (5.3 s.d.) and 1690 MeV/ c^2 (3.8 s.d.) in Fig. 4b) [20]. No obvious structure in mass regions of 1540, 1610 and 1821 MeV/ c^2 is seen in Fig. 4b). These observed peaks are a reflection from resonances $\Lambda(1520)$ and $\Lambda(1700)$ in $(p\overline{K}^0)$ invariant mass spectrum from $(\overline{K}^0 n)$ in reactions $p+p \rightarrow K^+(\overline{K}^0 pnX)$.

VI. ΛK_s^0 - SPECTRUM ANALYSIS

Figure ?? shows the invariant mass of 1012 (ΛK_s^0) combinations with bin sizes 11 MeV/ c^2 [21]. The solid curve is the sum of the background obtained by the first method and 4 Breit-Wigner curves (Figure ??). A number of peculiarities were found in the effective mass spectrum of system ΛK_s^0 in the ranges (1650-1680), (1740-1750), (1785-1805), (1835-1860) and (1925-1950) MeV/ c^2 in collision of a 10 GeV/ c momentum with propane. The detailed research of structure of mass spectrum has shown, that the significant enhancements have been obtained in two effective mass ranges 1750 MeV/ c^2 and 1795 MeV/ c^2 . These peaks could be interpreted as a possible candidates of two pentaquark states: the N^0 with quark content $udsds$ decaying into ΛK_s^0 and the Ξ^0 quark content $udssd$ decaying into $\Lambda \overline{K}_s^0$. The preliminary total cross section for $N^0(1750)$ production in p +propane interactions is estimated to be $\approx 30 \mu\text{b}$.

VII. $K_s^0\pi^\pm$ SPECTRA ANALYSIS

The scalar mesons have vacuum quantum numbers and are crucial for a full understanding of the symmetry breaking mechanisms in QCD, and presumably also for confinement[13]. Suggestions that the $\sigma(600)$ and $\kappa(800)$ could be glueballs have been made.

The study in [14] for vector mesons $K^{*\pm}(892)$ in pp interactions at 12 and 24 GeV/c by using data(280000 - events) from exposure of CERN 2m hydrogen bubble chamber to p beams. Total inclusive cross sections for $K^{*\pm} \rightarrow K_s^0\pi^\pm X$ in pp interactions are equal to 0.27 ± 0.03 and $0.04 \pm_{0.03}^{0.02}$ for K^{*+} and K^{*-} respectively.

A. $K_s^0\pi^+$ - spectrum

Figure 5a) shows the invariant mass distribution from all experimental 6400($K_s^0\pi^+$) combinations with bin size of 16 MeV/ c^2 [23],[24]. The average effective mass resolution of $K_s^0\pi$ system is equal to $\approx 2\%$. The dashed curve is the background taken in the form of a polynomial up to the 8-th degree(Figure 5a) which agreed with background by FRITIOF too. There are enhancements in mass regions of: 720,780,840,890 and 1060 MeV/ c^2 . The peak M(890) in invariant mass spectrum is identified as well known resonance from PDG. The preliminary interpretation of the peak in mass ranges of 1060 MeV/ c^2 is a reflection from well known Φ resonance by channel of $\Phi \rightarrow K_s^0(\pi^+\pi^-)$.

The effective mass distributions of 3259($K_s^0\pi^+$) combinations over the momentum range of $0.05 < p_{\pi^+} < 0.900$ GeV/c with bin size 18 MeV/ c^2 is shown in Figure 5b. Backgrounds by FRITIOF and polynomial methods has a similarly form. There are enhancements in mass regions of: 720,778 and 890 MeV/ c^2 . The solid curve in Figure 5b is the sum of 2BW and background (black solid curve) taken in the form of a polynomial up to the 6-th degree. The dashed curve(red) is the background by polynomial without range of $0.75 < M_{K_s^0\pi} < 0.98$ MeV/ c^2 when a 1BW function was done.

B. $K_s^0\pi^-$ - spectrum

Figure 5c) shows the invariant mass distribution of 2670 ($K_s^0\pi^-$) combinations with bin size of 15 MeV/ c^2 [23],[24]. The solid curve in Figure 5c is the sum of 2BW and background (below black solid curve) taken in the form of a polynomial up to the 6-th degree. The dashed curve(red) is the background by polynomial without range of $0.75 < M_{K_s^0\pi} < 0.96$ MeV/ c^2 when a 1BW function was done. There are significant enhancements in mass regions of 720,780 and 890 MeV/ c^2 (Table II

).The peak 890 MeV/c² in invariant mass spectrum is identified as well known resonances from PDG.The preliminary total cross section for M(720) production in p+propane interactions is larger than 30μb.

VIII. CONCLUSION

- Significant enhancements in invariant mass ranges of 1382 MeV/c² for $\Sigma^{*+} \rightarrow \Lambda\pi^+$ and 890 MeV/c² ($K^{*\pm}(892) \rightarrow K_s^0\pi\pm$) are observed which are test for this method and agreed with PDG .
- A number of important peculiarities were observed in the effective mass spectra for $pA \rightarrow \Lambda(K_s^0)X$ reactions by decay modes[18]-[24]: $\Lambda\pi^\pm$, Λp (Table I), $\Lambda pp, K_s^0\Lambda$, $K_s^0\pi\pm$ (Table II) and K_s^0p .
- The experimental Λ/π^+ ratio for average multiplicities in the pC reaction is approximately two times larger than this ratio from pp reaction .
- The width of excited $\Sigma^{*-}(1385)$ is two time larger than PDG (preliminary result).
- The production of stopped in medium $\Xi^- \rightarrow \Lambda\pi^-$ is 7-8 times larger than expected geometrical cross section for p+propane interaction (preliminary result).
- A few events were registered by hypothesis of S=-2 light and heavy $H^{0,+}$ dibaryons by weak decay channels[19],[23].

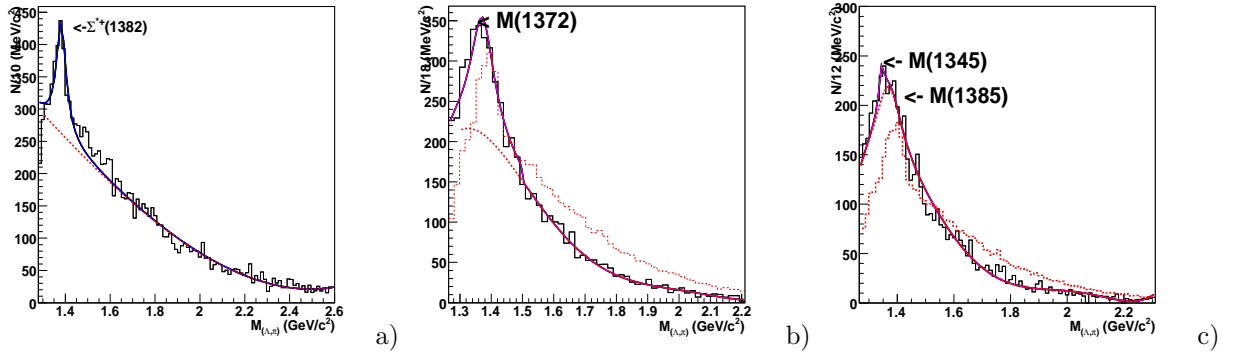


Fig. 1: a)The $\Lambda\pi^+$ - spectrum; b)All $\Lambda\pi^-$ comb with bin size of 18 MeV/c². c) $\Lambda\pi^-$ spectrum with bin size of 12 MeV/c². The simulated events by FRITIOF is the dashed histogram. The background is the dashed curve.

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- [1] T.Yamazaki, Y.Akaishi,Phys.Lett. B453,p.p.1-6,1999.
 - [2] R.L. Jaffe, Phys. Rev. D 15 267, 281,1977.
 - [3] T.Yamazaki, Y.Akaishi,Phys.Lett. B535,70,2002.

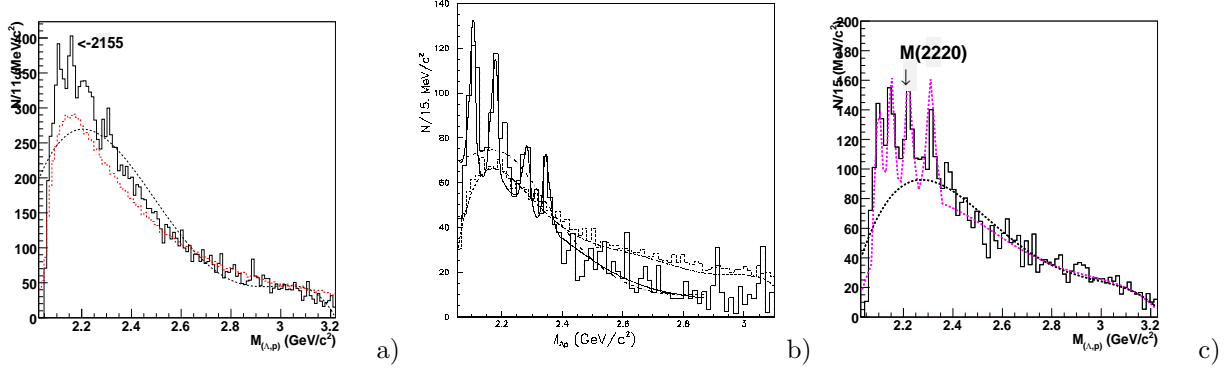


Fig. 2: a) All comb for the Λp spectrum; b) Λp spectrum with identified protons in momentum range of $0.35 < P_p < 0.90$ GeV/c; c) Λp spectrum with stopped protons in momentum range of $0.14 < P_p < 0.30$ GeV/c. The dashed histogram is simulated events by FRITIOF.

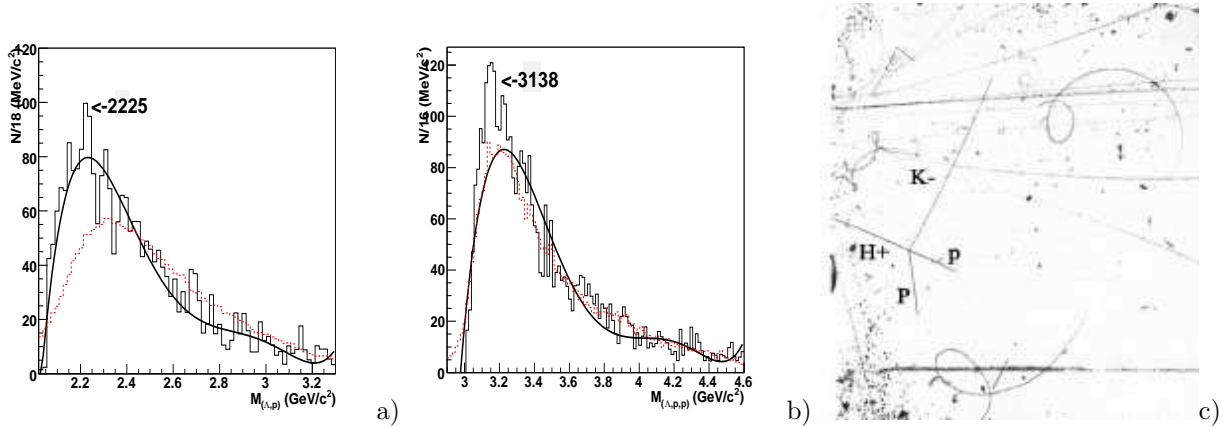


Fig. 3: a) Λp spectrum for relativistic positive tracks in range of $P_p > 1.65$ GeV/c; b) Λpp spectrum for identified protons; c) The weak decay for $H^+ \rightarrow K^- pp$. The dashed histogram is simulated events by FRITIOF. The experimental background is the solid curve.

- [4] T. Suzuki et al., Phys. Lett. B 597 (2004) 263.
- [5] Ts. Sakai et.al., Osaka U., nucl-th/9912063, Dec. 1999.
- [6] M. Deutshman et al., Nucl. Phys. B103, p.426, 1970.
- [7] V.L. Lyuboshits et al., JINR Rapid Comm., N6(74), p209, 1995.
- [8] FRITIOF, H. Pi, Comput. Phys. Com., 173, 1992. A.S. Galoian et al., JINR Comm., P1-2002-54, 2002.
- [9] D. Akers, arXiv.org:hep-ex/0310014, 2004.
- [10] A.A. Arkhipov: Archive:hep-ph/0403284v3, 2004.
- [11] P. Palazzi, p3a-2005-005, (2005), <http://particlez.org/p3a/abstract/2005-002.html>

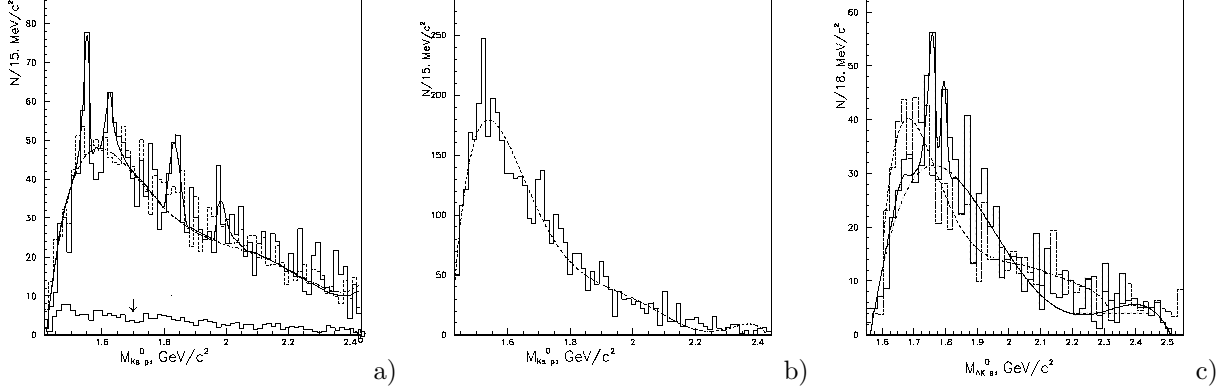


Fig. 4: a) $K_s^0 p$ spectrum for identified protons in range of $0.35 < P_p < 0.90 \text{ GeV}/c$ ($\overline{K}^0 p$ comb. by FRITIOF - below histogram); b) $(K_s^0, \text{pos. relativistic tracks})$ spectrum in momentum range of $0.9 < P_p < 1.7 \text{ GeV}/c$; c) $K_s^0 \Lambda$ spectrum. The dashed histogram is simulated events by FRITIOF.

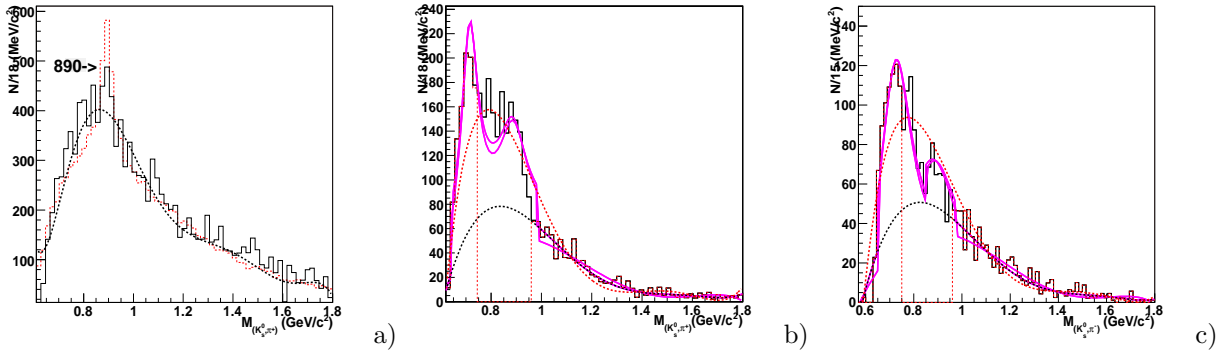


Fig. 5: a) The invariant mass distribution of $(K_s^0 \pi^+)$ without cuts; b) $(K_s^0 \pi^+)$ spectrum in momentum range of $P_p < 0.9 \text{ GeV}/c$, without background from comb. with protons; c) the invariant mass distribution of $(K_s^0 \pi^-)$ without cuts. The dashed histogram is simulated events by FRITIOF.

- [12] V. Guzey, Phys. Rev. C 69, (2004), 065203, hep-ph/0402060.
- [13] C. Amsler, N.A. Tornqvist, Physics Reports 389 (2004), 61117.
- [14] K. Bochmann et al., Nucl. Phys. B 166, p.284, 1980.
- [15] D. Diakonov, V. Petrov, and M. Polyakov, Z. Phys. A 359, 305, 1997.
- [16] DIANA Coll., V. Barmin et al., arXiv:hep-ex/06003018, 2006; Phys. At. Nucl., 66, 1715-1718, 2003.
- [17] SVD-2 experiment, A. Aleev et al., Proc ICHEP06, Moscow, 29 July, 2006: arXiv:hep-ex/0509033, 2005.
- [18] P.Z. Aslanyan et al., Proc. Conf. on LEAP05, May 16-22, Bonn, 2005; AIP, v. 796, p.195, ISBN 0-7354-0284-1. Proc. I.Ya. Pomeranchuk and Physics at the Turn of Centuries, Moscow, 24-28 Jan. 2003.

Tab. I: The effective mass , width(Γ) and S.D. for Λp resonances with stopped protons in momentum range of $0.14 < P_p < 0.30$ GeV/c in p+ propane collisions.

Resonance	$M_{\Lambda p}$	Experimental		The statistical
Decay	MeV/ c^2	width Γ_e	Γ	significance
Mode		MeV/ c^2	\approx	S.D.
Λp	2100	36	24	5.7
	2150	32	19	5.7
	2220	36	23	6.1
	2310	44	30	3.7
	2380	46	32	3.5

Tab. II: The effective mass, the width(Γ) and S.D. for $K_s^0 \pi^\pm$ resonances in p+ propane collisions.

Resonance	$M_{K\pi}$	Experimental		The statistical
Decay	MeV/ c^2	width Γ_e	Γ	significance
Mode		MeV/ c^2		$S.D._{max} - S.D._{min}$
$K_s^0 \pi^\pm$	890	75	50	6.0-8.2
$K_s^0 \pi^\pm$	780-800	33	10	2.5-4.2
$K_s^0 \pi^\pm$	720-730	50-145	30-125	4.1-15.2

- [19] P.Z. Aslanyan, JINR Commun.,E-2001-265,2002. Nucl. Phys. B 75B(1999),p.63-65.
- [20] P.Aslanyan et al.,JINR, E1-2004-137,2004; Nuclear Physics A 755, 375, (2005).
- [21] P.Zh. Aslanyan et al.,Physics of Particles and Nuclei Letters, Vol. 3, No. 5,pp. 331-334, 2006.JINR Commun.,E1-2005-149, 2005.
- [22] P.Zh. Aslanyan et al.,Phys. of Part. and Nuclei Letters, Vol. 4, No. 1,pp. 99-108, 2007. JINR Commun.,E1-2005-150, 2005.
- [23] P.Z. Aslanyan et. al., Proc. XVIII ISHEPP, Dubna,September 25-30, 2006. Proc. , Spin'06, October 2-7, Kyoto, Japan 2006, ISBN 978-0-7354-0423-6,AIP, v.915.ArXiv:hep-ex/0610086v1.
- [24] P.Z. Aslanyan,Proc. IUTP'07,Schladming,Austria, 25-3 March, 2007.